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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/760,651	01/20/2004	Gregory Edward Tierney	200313615-1	9869

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EXAMINER

PHAN, RAYMOND NGAN

ART UNIT	PAPER NUMBER
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2111

DATE MAILED: 12/19/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/760,651	Applicant(s) TIERNEY ET AL.	
	Examiner Raymond Phan	Art Unit 2111	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 20 January 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-35 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 19-24 is/are allowed.
- 6) ☒ Claim(s) 1-3, 8-12, 16, 17, 25 and 29-34 is/are rejected.
- 7) ☒ Claim(s) 4-7, 13-15, 18, 26-28 and 35 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|-----------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>01202004</u> . | 6) <input type="checkbox"/> Other: _____ |

Part III DETAILED ACTION

Notice to Applicant(s)

1. This application has been examined. Claims 1-35 are pending.
2. The Group and/or Art Unit location of your application in the PTO has changed. To aid in correlating any papers for this application, all further correspondence regarding this application should be directed to Group Art Unit 2111.

Specification

3. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. § 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 1-3, 8-12, 16-17, 25, 29-34 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Sharma et al. (US No. 6,108,737) in view of Martin et al. (US No. 6,883,070).

In regard to claims 1, 25, Sharma et al. disclose a system comprising: a home node that receives a first request for data from a first node according to a first cache coherency protocol (see col. 10, lines 53-65) and provides a second request for the data based on the first request (see col. 12, lines 45-58). But Sharma et al. do not specifically disclose a second node that provides a conflict response to the second request, the conflict response indicating that an ordering point for the data is migrating according to a second cache coherency protocol,

which is different from the first cache coherency protocol. However Martin et al. disclose a second node that provides a conflict response to the second request, the conflict response indicating that an ordering point for the data is migrating according to a second cache coherency protocol (see col. 8, lines 1-47), which is different from the first cache coherency protocol (see col. 2, lines 49-61).

Therefore, it would have been obvious to a person of an ordinary skill in the art at the time the invention was made to have combined the teachings of Martin et al. within the system of Sharma et al. because it would provide an adaptive, hybrid protocol that is sensitive to the bandwidth available for communication of cache protocol messages.

In regard to claim 2, Martin et al. disclose wherein the home node provides a retry request associated with the second request for the data in response to the conflict response from the second node (see col. 8, lines 26-33). Therefore, it would have been obvious to a person of an ordinary skill in the art at the time the invention was made to have combined the teachings of Martin et al. within the system of Sharma et al. because it would provide an adaptive, hybrid protocol that is sensitive to the bandwidth available for communication of cache protocol messages.

In regard to claim 3, Martin et al. disclose wherein, in response to the retry request associated with the second request, the home node and the first node each receives a response that includes a copy of the data which completes the request for the data from the first node according to the first cache coherency protocol (see col. 8, lines 1-48). Therefore, it would have been obvious to a person of an ordinary skill in the art at the time the invention was made to have combined the teachings of Martin et al. within the system of Sharma et al. because it would

provide an adaptive, hybrid protocol that is sensitive to the bandwidth available for communication of cache protocol messages.

In regard to claims 8, 16, 30, Martin et al. disclose wherein the first cache coherency protocol comprises a forward progress cache coherency protocol (i.e. directory-based protocol (see col. 2, lines 53-55). Therefore, it would have been obvious to a person of an ordinary skill in the art at the time the invention was made to have combined the teachings of Martin et al. within the system of Sharma et al. because it would provide an adaptive, hybrid protocol that is sensitive to the bandwidth available for communication of cache protocol messages.

In regard to claim 9, Martin et al. disclose wherein the forward progress protocol comprises one of a null-directory cache coherency protocol and a directory-based cache coherency protocol (see col. 2, lines 53-55). Therefore, it would have been obvious to a person of an ordinary skill in the art at the time the invention was made to have combined the teachings of Martin et al. within the system of Sharma et al. because it would provide an adaptive, hybrid protocol that is sensitive to the bandwidth available for communication of cache protocol messages.

In regard to claims 10, 29, Martin et al. disclose wherein the second cache coherency protocol comprises a source broadcast cache coherency protocol (i.e. snoop protocol) (see col. 2, lines 51-53). Therefore, it would have been obvious to a person of an ordinary skill in the art at the time the invention was made to have combined the teachings of Martin et al. within the system of Sharma et al. because it would provide an adaptive, hybrid protocol that is sensitive to the bandwidth available for communication of cache protocol messages.

In regard to claim 11, Sharma et al. disclose wherein each of the first and second nodes comprises a respective processor having an associated cache that comprises a plurality of cache lines, each of the first and second nodes being programmed to facilitate interaction between the first protocol and the second protocol during migration of the ordering point from the cache of the second node to the cache of the first node (see figure 1, col. 6, lines 14-58).

In regard to claims 12, 31, Sharma et al. disclose a multi-processor computer system comprising: a home node provides at least one snoop to obtain a copy of a line of data in response to a request provided by a first processor (see col. 12, lines 45-58), the home node reissues the at least one snoop when another copy of the line of data exists in the system associated with a broadcast-based protocol and no copy of the line of data is returned in response to the request provided by the first processor (see figure 10, col. 15, line 49 through col. 16, line 8), the another copy of the line of data being at least as up-to-date as the line of data in memory associated with the home node (see col. 16, lines 39-58). But Sharma et al. do not specifically disclose a request provided by the first processor in a forward progress protocol. However Martin et al. disclose the difference of first cache protocol (i.e. directory-based protocol) and a second cache coherency protocol (i.e. snooping protocol) (see col. 2, lines 49-61). Therefore, it would have been obvious to a person of an ordinary skill in the art at the time the invention was made to have combined the teachings of Martin et al. within the system of Sharma et al. because it would provide an adaptive, hybrid protocol that is sensitive to the bandwidth available for communication of cache protocol messages.

In regard to claim 17, Sharma et al. disclose wherein each of the home node and the first processor receives a response that includes a copy of the line of data to complete the request provided by the first processor (see col. 16, lines 9-59).

In regard to claim 32, Sharma et al. disclose further providing a source broadcast request to the first processor for the data according to a broadcast-based protocol, the ordering point migrating in response to the source broadcast request for the data (see col. 16, lines 9-39).

In regard to claim 33, Sharma et al. further comprising: providing an ownership data response from the first processor in response to the source broadcast request for the data (see col. 16, lines 9-39); and transitioning a state associated with the data at the first processor from an owner state to a transition state associated with the migration of the ordering point (see col. 17, line 54 through col. 18, line 25).

In regard to claim 34, Sharma et al. further comprising transitioning a state associated with the data at a second processor that provided the source broadcast request for the data in response to receiving the ownership data response, the second state defining the second processor as a new cache ordering point (see col. 17, line 54 through col. 18, line 39).

Allowable Subject Matter

6. Claims 19-24 are allowable over the prior of records.
7. Claims 4-7, 13-15, 18, 26-28, 35, are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.
8. The following is an Examiner's statement of reasons for the indication of allowable subject matter: Claims 4, 13, 18, 19, 26, 35, are allowable over the prior

art of record because the Examiner found neither prior art cited in its entirety, nor based on the prior art, found any motivation to combine any of the said prior arts which teach wherein second node has a transition state associated with the data in response to sending an ownership data response to a third node, the second node providing the ownership data response to a source broadcast request provided by the third node according to the second cache coherency protocol (claims 4); second processor having an associated cache that includes the line of data in a cache line having a state indicative of migration of a cache ordering point for the line of data from the second processor to a third processor according to the broadcast-based protocol (claim 13); wherein the home node sets a conflict condition based on at least one of receiving a request for the line of data provided by another node according to the broadcast-based protocol and receiving a conflict response to the home node provided in response to the at least one snoop provided by the home node, the home node reissuing the at least one snoop in response to setting the conflict condition (claim 18); the owner processor providing a conflict response to the home node in response to receiving the snoop request while having the transition state associated with the data, the home node reissues the snoop request for the data in response to the conflict response from the owner processor (claim 19); wherein the request for the data in a first cache coherency protocol is provided by a second processor node, the second processor node providing a miss response to the first snoop to the home node, the second processor node also providing a response to the second snoop to the home node and to a third processor node, the response to the second snoop including a copy of the data (claim 26); the response to the reissued snoop request being provided to the home node and to a third

processor that provided the request for the data according to the forward progress protocol (claim 35).

Conclusion

9. Claims 1-3, 8-12, 16-17, 25, 29-34 are rejected. Claims 4-7, 13-15, 18, 26-28, 35 are objected. Claims 19-24 are allowed.

10. The prior arts made of record and not relied upon are considered pertinent to applicant's disclosure.

Miller et al. (US No. 6,128,677) disclose a system and method for improved transfer of data between multiple processors and I/O bridges.

Alvarez et al. (US No. 6,467,012) disclose a method and apparatus using a distributed system structure to support bus-based cache-coherence protocol for symmetric multiprocessors.

Kruse et al. (US No. 6,529,990) disclose a method and apparatus to eliminate failed snoops of transactions caused by bus timing conflicts in a distributed symmetric multiprocessors system.

Neal et al. (US No. 6,351,784) disclose a system for determining whether a subsequent transaction may be allowed or must be allowed or must not be allowed to bypass a preceding transaction.

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to examiner Raymond Phan, whose telephone number is (571) 272-3630. The examiner can normally be reached on Monday-Friday from 6:30AM- 4:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's Primary, Paul Myers can be reached on (571) 272-3639 or via e-mail addressed to paul.myers@uspto.gov. The fax phone number for this Group is (571) 273-8300.

Communications via Internet e-mail regarding this application, other than those under 35 U.S.C. 132 or which otherwise require a signature, may be used by the applicant and should be addressed to [raymond.phan@uspto.gov].

All Internet e-mail communications will be made of record in the application file. PTO employees do not engage in Internet communications where there exists a possibility that sensitive information could be identified or exchanged unless the record includes a properly signed express waiver of the confidentiality requirements of 35 U.S.C. 122. This is more clearly set forth in the Interim Internet Usage Policy published in the Official Gazette of the Patent and Trademark on February 25, 1997 at 1195 OG 89.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Any inquiry of a general nature or relating to the status of this application should be directed to the TC 2100 central telephone number is (571) 272-2100.



Raymond Phan
December 1, 2005



TIM VO
PRIMARY EXAMINER